



CONSTRUCTION LEADERS

| LETTER OF TRANSMITTAL          |                            |
|--------------------------------|----------------------------|
| DATE: <b>February 25, 2015</b> | PCL JOB NO: <b>5515002</b> |
| ATTN: <b>Chris Barker</b>      | TRANSMITTAL NO: <b>013</b> |

To: **State of Vermont Agency of Transportation**  
 One National Life Drive  
 Montpelier, VT 05633-5001  
 (802) 828-0053

Re: Hartford Lateral Slide  
 Project No.: IM 091-2(79)  
 Contract ID.: 12A132

County: Windsor

PCL FILE NO: 5515002-10

WE ARE SENDING  Attached  Under separate cover via Email & SP the following:  
 Shop drawings  Prints  Plans  Samples  Specifications  
 Copy of Letter  Change Order  Other

| COPIES | SPEC.   | REVISION | DESCRIPTION                            |
|--------|---------|----------|--|
| 1      | 501.33  |          | HPC Class A Mix Design                 |
| 1      | 501.34  |          | HPC Class B Mix Design                 |
| 1      | 541.30  |          | Class C Mix Design                     |
| 1      | 900.608 |          | HPC Rapid Set Mix Design               |
| 1      | 900.608 |          | HPC Rapid Set Testing Reports          |
| 1      | 900.670 |          | HPC Class A Mix Design (5 KSI Precast) |

TRANSMITTED for as checked below:

For approval  Approved as submitted  Resubmit 1 Copies for approval  
 For your use  Approved as noted  Submit  Copies for distribution  
 As requested  Returned for corrections  Return  Corrected prints  
 For review and comment

**Remarks:**

Please return an email of this approved submittal to Erich Heymann ([ewheymann@pcl.com](mailto:ewheymann@pcl.com)) and Jeremy Mackling ([jmackling@pcl.com](mailto:jmackling@pcl.com)).

We request the review and return of this submittal within 14 days. Please advise if this request cannot be met so we can plan accordingly.

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By: **Erich Heymann**, Project Engineer

COPY TO: Project Files



**CONSTRUCTION LEADERS**

**SUBMITTAL NO. : 10**  
**Concrete Mix Designs**

| <b>Item No.</b> | <b>Specification</b> | <b>Description</b>                     |
|-----------------|----------------------|--|
| 1               | 501.33               | HPC Class A Mix Design                 |
| 2               | 501.34               | HPC Class B Mix Design                 |
| 3               | 541.30               | Class C Mix Design                     |
| 4               | 900.608              | HPC Rapid Set Mix Design               |
| 5               | 900.608              | HPC Rapid Set Testing Reports          |
| 6               | 900.670              | HPC Class A Mix Design (5 KSI Precast) |

***PROJECT:***  
**HARTFORD LATERAL SLIDE**  
**PROJECT NO.: IM 091-2(79)**  
**CONTRACT ID.: 12A132**

***OWNER:***  
**STATE OF VERMONT AGENCY OF TRANSPORTATION**

***ENGINEER OF RECORD:***  
**STATE OF VERMONT AGENCY OF TRANSPORTATION**

***CONTRACTOR:***  
**PCL CIVIL CONSTRUCTORS, INC.**

**FEBRUARY 25, 2015**

**STATE OF VERMONT  
AGENCY OF TRANSPORTATION  
MATERIAL AND RESEARCH SECTION - STRUCTURAL CONCRETE UNIT**

**STRUCTURAL CONCRETE MIX DESIGN SUBMISSION**

Concrete class: HPC A  
 Additional Description \_\_\_\_\_  
 Ready Mix Supplier: CARROLL CONCRETE - W LEBANON, NH - RT 12A  
 Designed By Scott Jordan  
 Design strength \_\_\_\_\_ 4000 \_\_\_\_\_ PSI  
 Mix Design Style: Conventional  
 Agg weight - SSD or Dry: SSD

| Agency Use Only |          |
|-----------------|----------|
| Mix ID          | HP00-A-0 |
| Mix Design #    |          |
| Approved by     |          |
| Approved Date   |          |
| Spec Book Year  | 2011     |

Mix designs are valid for a 12 month period from date of approval or unless there is a change in material, material property or design parameter.

|  |   |                               |                   |                    |
|--|---|-------------------------------|-------------------|--------------------|
| <b>Cement:</b>                             |   | Specific Gravity _____        | _____ lb/cy       | _____ cf           |
| 701.02                                     | Source: _____<br>Brand Name: _____  |                               |                   |                    |
| <b>Cement Type III:</b>                    |   | Specific Gravity _____        | _____ lb/cy       | _____ cf           |
| 701.04                                     | Source: _____<br>Brand Name: _____  |                               |                   |                    |
| <b>Blended Cement:</b>                     |   | Specific Gravity <u>2.980</u> | <u>611</u> lb/cy  | <u>3.29</u> cf     |
| 701.06                                     | Source: <u>LAFARGE - TERCEM - MONTREAL, EAST PLANT</u><br>Brand Name: _____                       |                               |                   |                    |
| <b>Cement with Slag:</b>                   |   | Specific Gravity _____        | _____ lb/cy       | _____ cf           |
| 701.07                                     | Source: _____<br>Brand Name: _____  |                               |                   |                    |
| <b>Pozzolan:</b>                           |   | Specific Gravity _____        | _____ lb/cy       | _____ cf           |
| 725.03(a)                                  | Source: _____<br>Brand Name: _____  |                               |                   |                    |
| <b>Fly Ash:</b>                            |   | Specific Gravity _____        | _____ lb/cy       | _____ cf           |
| 725.03(a)                                  | Source: _____<br>Brand Name: _____  |                               |                   |                    |
| <b>Silica Fume:</b>                        |   | Specific Gravity _____        | _____ lb/cy       | _____ cf           |
| 725.03(b)                                  | Source: _____<br>Brand Name: _____  |                               |                   |                    |
| <b>Slag:</b>                               |   | Specific Gravity _____        | _____ lb/cy       | _____ cf           |
| 725.03(c)                                  | Source: _____<br>Brand Name: _____  |                               |                   |                    |
| <b>Water</b>                               |   |                               | <u>31</u> gals    | <u>258.7</u> lb/cy |
| <b>Air Content Target</b>                  |   |                               | <u>7.0</u> %      | <u>4.14</u> cf     |
| <b>Coarse Aggregate 3/8"</b>               | Absorption _____  | Specific Gravity _____        | _____ lb/cy       | _____ cf           |
| 704.02A                                    | Source: _____   |                               |                   |                    |
| <b>Coarse Aggregate 3/4"</b>               | Absorption <u>0.70</u>  | Specific Gravity <u>2.930</u> | <u>1769</u> lb/cy | <u>9.68</u> cf     |
| 704.02B                                    | Source: <u>LEBANON CRUSHED STONE - W LEBANON, NH</u>  |                               |                   |                    |
| <b>Coarse Aggregate 1 1/2"</b>             | Absorption _____  | Specific Gravity _____        | _____ lb/cy       | _____ cf           |
| 704.02C                                    | Source: _____   |                               |                   |                    |
| <b>Fine Aggregate:</b>                     | Absorption <u>1.40</u>  | Specific Gravity <u>2.700</u> | <u>1348</u> lb/cy | <u>8.00</u> cf     |
| 704.01                                     | Source: <u>LEBANON CRUSHED STONE - W LEBANON, N</u>   | Fineness Modulus <u>2.78</u>  |                   |                    |
| <b>Air Entrainment Admixture</b>           |   | Specific Gravity _____        | <u>1</u> oz/cy    |                    |
| 725.02(b)                                  | Source: <u>MASTER BUILDERS INC - MESQUITE, TX</u><br>Brand Name: <u>MasterAir AE 200/MicroAir</u> |                               |                   |                    |
| <b>Retarder Admixture:</b>                 |   | Specific Gravity _____        | <u>0.5</u> oz/cwt |                    |
| 725.02(c)                                  | Source: <u>MASTER BUILDERS INC - MESQUITE, TX</u><br>Brand Name: <u>MasterSet R100</u>            |                               |                   |                    |
| <b>High Range Water Reducer Admixture:</b> |   | Specific Gravity _____        | <u>4</u> oz/cwt   |                    |
| 725.02(h)                                  | Source: <u>MASTER BUILDERS INC - MESQUITE, TX</u><br>Brand Name: <u>MasterGlenium 7500</u>        |                               |                   |                    |
| <b>Other Admixtures:</b>                   |   | Specific Gravity _____        | _____ gal/cy      | _____ cf           |
|  | Source: _____<br>Brand Name: _____  |                               |                   |                    |
|  |   | Specific Gravity _____        | _____ oz/cwt      | _____ cf           |
|  | Source: _____<br>Brand Name: _____  |                               |                   |                    |
|  |   | Specific Gravity _____        | _____             | _____ cf           |
|  | Source: _____<br>Brand Name: _____  |                               |                   |                    |
| <b>TOTAL</b>                               |   | <u>46.610</u>                 | <u>3986.7</u> lb  | <u>27.00</u> cf    |
| Maximum Water/Cementitious Ratio           |   | <u>0.44</u>                   |                   |                    |
| Maximum Water (gal/cy)                     |   | <u>32.2</u>                   |                   |                    |
| Slump Min/Max (inch)                       |   | <u>4.0</u> min                | <u>7.0</u> max    |                    |
| Air Content Min/Max (%)                    |   | <u>5.5</u> min                | <u>8.5</u> max    |                    |
| Design Unit Wt. (lb/cf)                    |   | <u>147.66</u>                 |                   |                    |

Notes:

**STATE OF VERMONT  
AGENCY OF TRANSPORTATION  
MATERIAL AND RESEARCH SECTION - STRUCTURAL CONCRETE UNIT**

**STRUCTURAL CONCRETE MIX DESIGN SUBMISSION**

Concrete class: HPC B  
 Additional Description \_\_\_\_\_  
 Ready Mix Supplier: CARROLL CONCRETE - W LEBANON, NH - RT 12A  
 Designed By Scott Jordan  
 Design strength \_\_\_\_\_ 3500 \_\_\_\_\_ PSI  
 Mix Design Style: Conventional  
 Agg weight - SSD or Dry: SSD

| Agency Use Only |          |
|-----------------|----------|
| Mix ID          | HP00-B-0 |
| Mix Design #    |          |
| Approved by     |          |
| Approved Date   |          |
| Spec Book Year  | 2011     |

Mix designs are valid for a 12 month period from date of approval or unless there is a change in material, material property or design parameter.

|  |   |                                  |                               |                                |
|--|---|----------------------------------|-------------------------------|--------------------------------|
| <b>Cement:</b>                             |   | Specific Gravity _____           | _____ lb/cy                   | _____ 0.00 cf                  |
| 701.02                                     | Source: _____<br>Brand Name: _____  |                                  |                               |                                |
| <b>Cement Type III:</b>                    |   | Specific Gravity _____           | _____ lb/cy                   | _____ 0.00 cf                  |
| 701.04                                     | Source: _____<br>Brand Name: _____  |                                  |                               |                                |
| <b>Blended Cement:</b>                     |   | Specific Gravity <u>2.980</u>    | <u>564</u> lb/cy              | <u>3.03</u> cf                 |
| 701.06                                     | Source: <u>LAFARGE - TERCEM - MONTREAL, EAST PLANT</u><br>Brand Name: _____                       |                                  |                               |                                |
| <b>Cement with Slag:</b>                   |   | Specific Gravity _____           | _____ lb/cy                   | _____ 0.00 cf                  |
| 701.07                                     | Source: _____<br>Brand Name: _____  |                                  |                               |                                |
| <b>Pozzolan:</b>                           |   | Specific Gravity _____           | _____ lb/cy                   | _____ 0.00 cf                  |
| 725.03(a)                                  | Source: _____<br>Brand Name: _____  |                                  |                               |                                |
| <b>Fly Ash:</b>                            |   | Specific Gravity _____           | _____ lb/cy                   | _____ 0.00 cf                  |
| 725.03(a)                                  | Source: _____<br>Brand Name: _____  |                                  |                               |                                |
| <b>Silica Fume:</b>                        |   | Specific Gravity _____           | _____ lb/cy                   | _____ 0.00 cf                  |
| 725.03(b)                                  | Source: _____<br>Brand Name: _____  |                                  |                               |                                |
| <b>Slag:</b>                               |   | Specific Gravity _____           | _____ lb/cy                   | _____ 0.00 cf                  |
| 725.03(c)                                  | Source: _____<br>Brand Name: _____  |                                  |                               |                                |
| <b>Water</b>                               |   |                                  | <u>29</u> gals                | <u>242.01</u> lb/cy            |
| <b>Air Content Target</b>                  |   |                                  | <u>7.0</u> %                  | <u>1.89</u> cf                 |
| <b>Coarse Aggregate 3/8"</b>               | Absorption _____  | Specific Gravity _____           | _____ lb/cy                   | _____ 0.00 cf                  |
| 704.02A                                    | Source: _____   |                                  |                               |                                |
| <b>Coarse Aggregate 3/4"</b>               | Absorption <u>0.70</u>  | Specific Gravity <u>2.930</u>    | <u>1149</u> lb/cy             | <u>6.28</u> cf                 |
| 704.02B                                    | Source: <u>LEBANON CRUSHED STONE - W LEBANON, NH</u>  |                                  |                               |                                |
| <b>Coarse Aggregate 1 1/2"</b>             | Absorption <u>0.40</u>  | Specific Gravity <u>2.940</u>    | <u>766</u> lb/cy              | <u>4.18</u> cf                 |
| 704.02C                                    | Source: <u>LEBANON CRUSHED STONE - W LEBANON, NH</u>  |                                  |                               |                                |
| <b>Fine Aggregate:</b>                     | Absorption <u>1.40</u>  | Specific Gravity <u>2.700</u>    | <u>1304</u> lb/cy             | <u>7.74</u> cf                 |
| 704.01                                     | Source: <u>LEBANON CRUSHED STONE - W LEBANON, N</u>   | Fineness Modulus <u>2.78</u>     |                               |                                |
| <b>Air Entrainment Admixture</b>           |   | Specific Gravity _____           | <u>1.5</u> oz/cy              |                                |
| 725.02(b)                                  | Source: <u>MASTER BUILDERS INC - MESQUITE, TX</u><br>Brand Name: <u>MasterAir AE 200/MicroAir</u> |                                  |                               |                                |
| <b>Retarder Admixture:</b>                 |   | Specific Gravity _____           | <u>0.5</u> oz/cwt             |                                |
| 725.02(c)                                  | Source: <u>MASTER BUILDERS INC - MESQUITE, TX</u><br>Brand Name: <u>MasterSet R100</u>            |                                  |                               |                                |
| <b>High Range Water Reducer Admixture:</b> |   | Specific Gravity _____           | <u>4</u> oz/cwt               |                                |
| 725.02(h)                                  | Source: <u>MASTER BUILDERS INC - MESQUITE, TX</u><br>Brand Name: <u>MasterGlenium 7500</u>        |                                  |                               |                                |
| <b>Other Admixtures:</b>                   |   | Specific Gravity _____           | _____ gal/cy                  | _____ 0.00 cf                  |
|  | Source: _____<br>Brand Name: _____  |                                  |                               |                                |
|  |   | Specific Gravity _____           | _____ oz/cwt                  | _____ 0.00 cf                  |
|  | Source: _____<br>Brand Name: _____  |                                  |                               |                                |
|  |   | Specific Gravity _____           | _____                         | _____ 0.00 cf                  |
|  | Source: _____<br>Brand Name: _____  |                                  |                               |                                |
|  |   | <b>TOTAL</b>                     | <u>47.550</u>                 | <u>4025</u> lb <u>27.00</u> cf |
|  |   | Maximum Water/Cementitious Ratio | <u>0.49</u>                   |                                |
|  |   | Maximum Water (gal/cy)           | <u>33.1</u>                   |                                |
|  |   | Slump Min/Max (inch)             | <u>4.0</u> min <u>7.0</u> max |                                |
|  |   | Air Content Min/Max (%)          | <u>5.5</u> min <u>8.5</u> max |                                |
|  |   | Design Unit Wt. (lb/cf)          | <u>149.07</u>                 |                                |

Notes:



**STATE OF VERMONT  
AGENCY OF TRANSPORTATION  
MATERIAL AND RESEARCH SECTION - STRUCTURAL CONCRETE UNIT**

**STRUCTURAL CONCRETE MIX DESIGN SUBMISSION**

Concrete class: HPC RS  
 Additional Description \_\_\_\_\_  
 Ready Mix Supplier: CARROLL CONCRETE - W LEBANON, NH - RT 12A  
 Designed By Scott Jordan  
 Design strength 5000 PSI  
 Mix Design Style: SCC  
 Agg weight - SSD or Dry: SSD

| Agency Use Only |           |
|-----------------|-----------|
| Mix ID          | HP00-RS-0 |
| Mix Design #    |           |
| Approved by     |           |
| Approved Date   |           |
| Spec Book Year  | 2011      |

Mix designs are valid for a 12 month period from date of approval or unless there is a change in material, material property or design parameter.

|  |   |                               |                     |                 |
|--|---|-------------------------------|---------------------|-----------------|
| <b>Cement:</b>                             |   | Specific Gravity _____        | _____ lb/cy         | _____ cf        |
| 701.02                                     | Source: _____<br>Brand Name: _____  |                               |                     |                 |
| <b>Cement Type III:</b>                    |   | Specific Gravity _____        | _____ lb/cy         | _____ cf        |
| 701.04                                     | Source: _____<br>Brand Name: _____  |                               |                     |                 |
| <b>Blended Cement:</b>                     |   | Specific Gravity <u>2.980</u> | <u>720</u> lb/cy    | <u>3.87</u> cf  |
| 701.06                                     | Source: <u>LAFARGE - TERCEM - MONTREAL, EAST PLANT</u><br>Brand Name: _____                       |                               |                     |                 |
| <b>Cement with Slag:</b>                   |   | Specific Gravity _____        | _____ lb/cy         | _____ cf        |
| 701.07                                     | Source: _____<br>Brand Name: _____  |                               |                     |                 |
| <b>Pozzolan:</b>                           |   | Specific Gravity _____        | _____ lb/cy         | _____ cf        |
| 725.03(a)                                  | Source: _____<br>Brand Name: _____  |                               |                     |                 |
| <b>Fly Ash:</b>                            |   | Specific Gravity _____        | _____ lb/cy         | _____ cf        |
| 725.03(a)                                  | Source: _____<br>Brand Name: _____  |                               |                     |                 |
| <b>Silica Fume:</b>                        |   | Specific Gravity _____        | _____ lb/cy         | _____ cf        |
| 725.03(b)                                  | Source: _____<br>Brand Name: _____  |                               |                     |                 |
| <b>Slag:</b>                               |   | Specific Gravity <u>2.930</u> | <u>180</u> lb/cy    | <u>0.98</u> cf  |
| 725.03(c)                                  | Source: <u>LAFARGE - NEWCEM SLAG - BALT, MD</u><br>Brand Name: _____                              |                               |                     |                 |
| <b>Water</b>                               |   |                               |                     |                 |
| <b>Air Content Target</b>                  |   | <u>32</u> gals                | <u>267.04</u> lb/cy | <u>4.28</u> cf  |
| <b>Coarse Aggregate 3/8"</b>               | Absorption _____  | <u>7.0</u> %                  |                     | <u>1.89</u> cf  |
| 704.02A                                    | Source: _____   | Specific Gravity _____        | _____ lb/cy         | _____ cf        |
| <b>Coarse Aggregate 3/4"</b>               | Absorption <u>0.70</u>  | Specific Gravity <u>2.930</u> | <u>1605</u> lb/cy   | <u>8.78</u> cf  |
| 704.02B                                    | Source: <u>LEBANON CRUSHED STONE - W LEBANON, NH</u>  |                               |                     |                 |
| <b>Coarse Aggregate 1 1/2"</b>             | Absorption _____  | Specific Gravity _____        | _____ lb/cy         | _____ cf        |
| 704.02C                                    | Source: _____   |                               |                     |                 |
| <b>Fine Aggregate:</b>                     | Absorption <u>1.40</u>  | Specific Gravity <u>2.700</u> | <u>1184</u> lb/cy   | <u>7.03</u> cf  |
| 704.01                                     | Source: <u>LEBANON CRUSHED STONE - W LEBANON, N</u>   | Fineness Modulus <u>2.78</u>  |                     |                 |
| <b>Air Entrainment Admixture</b>           |   | Specific Gravity _____        | <u>20</u> oz/cy     |                 |
| 725.02(b)                                  | Source: <u>MASTER BUILDERS INC - MESQUITE, TX</u><br>Brand Name: <u>MasterAir AE 200/MicroAir</u> |                               |                     |                 |
| <b>Retarder Admixture:</b>                 |   | Specific Gravity _____        | _____ oz/cwt        |                 |
| 725.02(c)                                  | Source: _____<br>Brand Name: _____  |                               |                     |                 |
| <b>High Range Water Reducer Admixture:</b> |   | Specific Gravity _____        | <u>10</u> oz/cwt    |                 |
| 725.02(h)                                  | Source: <u>MASTER BUILDERS INC - MESQUITE, TX</u><br>Brand Name: <u>MasterGlenium 7500</u>        |                               |                     |                 |
| <b>Other Admixtures:</b>                   |   |                               |                     |                 |
| Specific performance admixture             |   | Specific Gravity <u>1.010</u> | <u>1.25</u> gal/cy  | <u>0.17</u> cf  |
| 725.02(i)                                  | Source: <u>MASTER BUILDERS INC - MESQUITE, TX</u><br>Brand Name: <u>MasterLife SRA20</u>          |                               |                     |                 |
| Specific performance admixture             |   | Specific Gravity _____        | <u>5</u> oz/cwt     | <u>0.00</u> cf  |
| 725.02(j)                                  | Source: <u>MASTER BUILDERS INC - MESQUITE, TX</u><br>Brand Name: <u>Rheotec Z60</u>               |                               |                     |                 |
|  | Source: _____<br>Brand Name: _____  | Specific Gravity _____        |                     | <u>0.00</u> cf  |
| <b>TOTAL</b>                               |   | <u>51.550</u>                 | <u>3966.6</u> lb    | <u>27.00</u> cf |

Maximum Water/Cementitious Ratio \_\_\_\_\_  
 Maximum Water (gal/cy) 0.0  
 Slump Min/Max (inch) 18.0 min 28.0 max  
 Air Content Min/Max (%) 5.5 min 8.5 max  
 Design Unit Wt. (lb/cf) 146.91

Notes:

01/06/2014

P.O. Box 1000, 8 Reeds Mill  
Newport, NH 03773(603) 298-0513  
Fax (603) 298-5102

## Cylinder Compressive Strength

4" x 8"

**Customer** Miller Construction Inc.  
**Project** Barnard ER BRF 0241(39)  
**Contractor:** Miller Construction  
**Plant:** 12A, W Lebanon, NH -  
**Mix Number:** HPC Rapid set

**Specified Strength:** 5000 Lbs/Sq.In.

Set No. BAR2  
 Date Sampled: 12/05/2013  
 Time Batched: 09:22  
 Time Sampled: 09:30  
 Days in Field: 0.0  
 Sampled By: Todd Blanchard  
 Unit Wt.: 148.7 PCF  
 Placement Location: Trial batch

Truck No.: m-1  
 Ticket No: BAR2  
 Slump: 9.50 in.  
 Spread: in.  
 Air Content: 7.0 %  
 Conc. Temp: 53 F  
 Air Temp: 37 F  
 Weather Cond.: Overcast

| Spec.No | Date Tested | Age, Days | Diameter in. | Compressive lb | Strength psi | FT | Remarks |
|---------|-------------|-----------|--------------|----------------|--------------|----|---------|
| BAR2A   | 12/05/2013  | 12 hrs    | 4.00         | 35,370         | 2,815        | A  |         |
| BAR2B   | 12/05/2013  | 12 hrs    | 4.00         | 36,070         | 2,870        | A  |         |
| BAR2C   | 12/06/2013  | 1         | 4.00         | 61,070         | 4,860        | B  |         |
| BAR2D   | 12/06/2013  | 1         | 4.00         | 63,110         | 5,022        | B  |         |
| BAR2E   | 12/12/2013  | 7         | 4.00         | 86,820         | 6,909        | D  |         |
| BAR2F   | 12/12/2013  | 7         | 4.00         | 83,220         | 6,622        | A  |         |
| BAR2G   | 01/02/2014  | 28        | 4.00         | 96,470         | 7,677        | C  |         |
| BAR2H   | 01/02/2014  | 28        | 4.00         | 95,030         | 7,562        | D  |         |
| BAR2I   | 01/02/2014  | 28        | 4.00         | 87,550         | 6,967        | A  |         |

**Notes:**

Concrete sampled according to ASTM C172.  
 Test specimens made and stored according to ASTM C31.  
 Unit weight measured according to ASTM C138.  
 Temperature of concrete measured according to ASTM C1064.  
 Air content measured according to ASTM C231 or C173.  
 Slump measured according to ASTM C143.  
 Tested in accordance with ASTM C39  
 Specimens capped in accordance with ASTM C617 or ASTM C1231

**Distribution:**

Fracture Type: a) cone; b) cone/split; c) cone/shear; d) shear; e) columnar

---

 Scott Jordan  
 (603) 298-0513

BRISTOL, NH - CHARLESTOWN, NH - KEENE, NH - PETERBOROUGH, NH - W. LEBANON, NH - WOODSVILLE, NH  
 BERLIN, VT - BRADFORD, VT - BRATTLEBORO, VT - COVENTRY, VT - GUILDHALL, VT - HIGHGATE, VT - JOHNSON, VT  
 - RANDOLPH, VT - ST. JOHNSBURY, VT - SWANTON, VT

Carroll Concrete Company  
Technical Field Report

|                             |                 |            |        |                   |        |                  |                |             |           |
|-----------------------------|-----------------|------------|--------|-------------------|--------|------------------|----------------|-------------|-----------|
| Customer                    | C.C.C.          |            |        |                   |        | Date             | 5-Dec-13       |             |           |
| Plant                       | W. Lebanon, NH. |            |        |                   |        | Mix stated       | #HPC Rapid Set | 5000#       |           |
| Contractor                  | Quality Control |            |        |                   |        | Truck #          | M-1            |             |           |
| Sub-contractor              |                 |            |        |                   |        | Cu yds           | 1 Cu Ft        |             |           |
| Job                         | Trial Mix       |            |        |                   |        | Time loaded      |                | 8:58        |           |
| Placement location          | Lab             |            |        |                   |        | Time sampled     |                | 9:07        |           |
|                             |                 |            |        |                   |        | Ticket #         |                | BAR1        |           |
|                             |                 |            |        |                   |        |                  |                |             |           |
| TYPE                        |                 | MIX DESIGN |        | DESIRED WTS       |        | ACTUAL WTS       |                | % Moist     | lbs water |
| Lafarge                     | Tercem          | 900 lbs    |        | 33.30 lbs         |        | 33.3 lbs         |                | in agg      | in agg    |
|                             | Pozz            |            | lbs    |                   | lbs    |                  | lbs            |             |           |
| 3/4" Ledge                  | Agg             | 1630 lbs   |        | 61.00 lbs         |        | 61 lbs           |                | 1.10%       | 0.67      |
| W. Sand                     | Agg             | 1180 lbs   |        | 44.80 lbs         |        | 44.8 lbs         |                | 2.50%       | 1.10      |
|                             | Agg             |            | lbs    |                   | lbs    |                  | lbs            |             |           |
|                             | Agg             |            | lbs    |                   | lbs    |                  | lbs            |             |           |
| Water at plant              | Water           | 233 lbs    |        | 6.90 lbs          |        | 6.90 lbs/Gallons |                |             |           |
| Water on job                |                 |            |        |                   |        | 1.50 lbs/Gallons |                |             |           |
| Micro-Air                   | Admix           | 8 ozs/cy   |        | 0.30 ozs          |        | 0.3 ozs          |                |             |           |
| Glenium 7500                | Admix           | 108 ozs/cy |        | 4 ozs             |        | 4 ozs            |                |             |           |
| 100XR                       | Admix           | 9 ozs/cy   |        | 0 ozs             |        | 0 ozs            |                |             |           |
| MasterLife SRA 20           | Admix           | 160 ozs/cy |        | 5.90 ozs          |        | 6 ozs            |                |             |           |
| Rheotec Z-60                | Admix           | 27 ozs/cy  |        | 1 ozs             |        | 1 ozs            |                |             |           |
|                             | Fiber           |            | lbs/cy |                   | lbs    |                  | lbs            | lbs admix   | 0.88      |
|                             | Total wt        |            |        |                   |        | 148.38           | Total wt       | Total water | 11.05     |
|                             |                 |            |        |                   |        | 4006.26          | lbs/cy         | W/C         | 0.332     |
|                             |                 |            |        |                   |        |                  |                |             |           |
| TEST RESULTS                |                 |            |        | YIELD CALCULATION |        |                  |                |             |           |
| Slump                       | 9 "             |            |        | Gross             | 43.82  |                  |                |             |           |
| Air content                 | 7.5 %           |            |        | Tare              | 7.13   |                  |                |             |           |
| C temp                      | 54 F            |            |        | Net               | 36.69  |                  |                |             |           |
| A temp                      | 39 F            |            |        | Factor            | 0.248  |                  |                |             |           |
| Weather                     | overcast        |            |        | Unit Wt           | 147.94 |                  |                |             |           |
| Cylinder identification #'s | BAR1            |            |        | Yield=            | 27.10  |                  |                |             |           |
|                             |                 |            |        |                   |        |                  |                |             |           |
|                             |                 |            |        |                   |        |                  |                |             |           |
|                             |                 |            |        |                   |        |                  |                |             |           |
| Remarks :                   |                 |            |        |                   |        |                  |                |             |           |
|                             |                 |            |        |                   |        |                  |                |             |           |
| Tested By :                 | Mike Fournier   |            |        |                   |        |                  |                |             |           |

Carroll Concrete Company  
Technical Field Report

|                             |                 |            |        |                   |        |                  |                |             |           |
|-----------------------------|-----------------|------------|--------|-------------------|--------|------------------|----------------|-------------|-----------|
| Customer                    | C.C.C.          |            |        |                   |        | Date             | 5-Dec-13       |             |           |
| Plant                       | W. Lebanon, NH. |            |        |                   |        | Mix stated       | #HPC Rapid Set | 5000#       |           |
| Contractor                  | Quality Control |            |        |                   |        | Truck #          | M-1            |             |           |
| Sub-contractor              |                 |            |        |                   |        | Cu yds           | 1 Cu Ft        |             |           |
| Job                         | Trial Mix       |            |        |                   |        | Time loaded      |                | 9:22        |           |
| Placement location          | Lab             |            |        |                   |        | Time sampled     |                | 9:30        |           |
|                             |                 |            |        |                   |        | Ticket #         |                | BAR2        |           |
|                             |                 |            |        |                   |        |                  |                |             |           |
| TYPE                        |                 | MIX DESIGN |        | DESIRED WTS       |        | ACTUAL WTS       |                | % Moist     | lbs water |
| Lafarge                     | Tercem          | 720 lbs    |        | 26.70 lbs         |        | 26.7 lbs         |                | in agg      | in agg    |
| Newcem                      | Pozz            | 180 lbs    |        | 6.70 lbs          |        | 6.7 lbs          |                |             |           |
| 3/4" Ledge                  | Agg             | 1630 lbs   |        | 61.00 lbs         |        | 61 lbs           |                | 1.10%       | 0.67      |
| W. Sand                     | Agg             | 1175 lbs   |        | 44.60 lbs         |        | 44.6 lbs         |                | 2.50%       | 1.10      |
|                             | Agg             |            | lbs    |                   | lbs    |                  | lbs            |             |           |
|                             | Agg             |            | lbs    |                   | lbs    |                  | lbs            |             |           |
| Water at plant              | Water           | 233 lbs    |        | 6.90 lbs          |        | 8 lbs/Gallons    |                |             |           |
| Water on job                |                 |            |        |                   |        | 0.70 lbs/Gallons |                |             |           |
| Micro-Air                   | Admix           | 7.5 ozs/cy |        | 0.28 ozs          |        | 0.25 ozs         |                |             |           |
| Glenium 7500                | Admix           | 108 ozs/cy |        | 4 ozs             |        | 4 ozs            |                |             |           |
| 100XR                       | Admix           | 9 ozs/cy   |        | 0 ozs             |        | 0 ozs            |                |             |           |
| MasterLife SRA 20           | Admix           | 160 ozs/cy |        | 5.90 ozs          |        | 6 ozs            |                |             |           |
| Rheotec Z-60                | Admix           | 27 ozs/cy  |        | 1 ozs             |        | 1 ozs            |                |             |           |
|                             | Fiber           |            | lbs/cy |                   | lbs    |                  | lbs            | lbs admix   | 0.88      |
|                             | Total wt        |            |        |                   |        | 148.58           | Total wt       | Total water | 11.35     |
|                             |                 |            |        |                   |        | 4011.66          | lbs/cy         | W/C         | 0.340     |
|                             |                 |            |        |                   |        |                  |                |             |           |
| TEST RESULTS                |                 |            |        | YIELD CALCULATION |        |                  |                |             |           |
| Slump                       | 9.5 "           |            |        | Gross             | 44     |                  |                |             |           |
| Air content                 | 7 %             |            |        | Tare              | 7.13   |                  |                |             |           |
| C temp                      | 53 F            |            |        | Net               | 36.87  |                  |                |             |           |
| A temp                      | 37 F            |            |        | Factor            | 0.248  |                  |                |             |           |
| Weather                     | overcast        |            |        | Unit Wt           | 148.66 |                  |                |             |           |
| Cylinder identification #'s | BAR2            |            |        | Yield=            | 27.00  |                  |                |             |           |
|                             |                 |            |        |                   |        |                  |                |             |           |
|                             |                 |            |        |                   |        |                  |                |             |           |
|                             |                 |            |        |                   |        |                  |                |             |           |
| Remarks :                   |                 |            |        |                   |        |                  |                |             |           |
|                             |                 |            |        |                   |        |                  |                |             |           |
| Tested By :                 | Mike Fournier   |            |        |                   |        |                  |                |             |           |



Client: **Carroll Concrete**  
Project: **Barnard ER BRF 0241 (39)**  
  
Contact: **Scott Jordan**  
Submitter: **Scott Jordan**  
Date Received: **January 28, 2014**

CTL Project No: **382075**  
CTL Project Mgr **Xiuping Feng**  
Analyst: **P. Brindise**  
Approved: **J. Jones**  
Date Analyzed: **January 30, 2014**  
Date Reported: **January 31, 2014**

**REPORT of ANALYSIS**

**ASTM C1202 (AASHTO T277)**

Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration

| <u>Sample ID</u> | <u>Reported<br/>Cast Date</u> | <u>Test Date</u> | <u>Age on Test<br/>Date</u> | <u>Charge Passed<br/>(coulombs)</u> | <u>Chloride Ion<br/>Penetrability</u> |
|------------------|-------------------------------|------------------|-----------------------------|-------------------------------------|---------------------------------------|
| BAR2 12-5-1      | 12/5/2013                     | 1/30/2014        | 56                          | 1411                                | Low                                   |
| BAR2 12-5-2      | 12/5/2013                     | 1/30/2014        | 56                          | 1482                                | Low                                   |
| BAR2 12-5-3      | 12/5/2013                     | 1/30/2014        | 56                          | 1342                                | Low                                   |
| <b>Average</b>   |                               |                  |                             | <b>1412</b>                         | <b>Low</b>                            |

**Interpretation of results:**

ASTM C1202 - 12, Table X1.1: Chloride Ion Penetrability Based on Charge Passed

| <u>Charge Passed (coulombs)</u> | <u>Chloride Ion Penetrability</u> |
|---------------------------------|-----------------------------------|
| >4000                           | High                              |
| 2000 - 4000                     | Moderate                          |
| 1000 - 2000                     | Low                               |
| 100 - 1000                      | Very Low                          |
| < 100                           | Negligible                        |

**Notes:**

1. Source of the cylinder: three 4 x 8" cylinders were received at CTLGroup on Jan. 28, 2014.
2. Location of test specimens: One 4x2-inch nominal disk was saw-cut from the top of each submitted concrete cylinder.
3. Type of concrete: unknown
4. Curing History: Samples were tested upon arrival.
5. This analysis specifically represents the submitted samples.
6. This report may not be reproduced except in its entirety.

Corporate Office and Laboratory: 5400 Old Orchard Road Skokie, Illinois 60077-1030



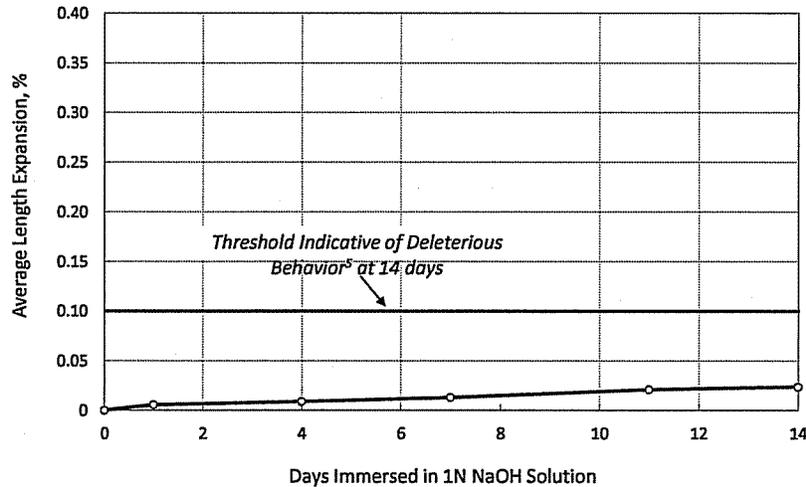
Client: Carroll Concrete  
 Project: Materials Testing  
 Barnard ER BRF 0241 (39)

CTLGroup Project No.: 382075  
 CTLGroup Work Request No.: 36001  
 CTLGroup Proj. Mgr.: Xiuping Feng  
 Aggregate Processing By: BS  
 Test Specimens Cast By: VS  
 Test Specimens Measured By: WD  
 Approved: D. Broton  
 Report Date: February 21, 2014

Contact: Mr. Scott Jordan  
 Submitter: Mr. Scott Jordan  
 Date Received: April 4, 2013

**Modified AASHTO T303, "Standard Method of Test for Accelerated Detection of Potentially Deleterious Expansion of Mortar Bars Due to Alkali-Silica Reaction"**

|   |                       |                               |                   |
|---|-----------------------|-------------------------------|-------------------|
| <b>Material:</b> Coarse Aggregate       | <b>Fine Aggregate</b> | <b>Cement</b>                 | <b>Slag</b>       |
| <b>Client ID:</b> 3/4 Lebanon Stone     | Lebanon Sand          | Terzem Cement                 | Newcem Slag       |
| <b>CTLGroup ID:</b> 3600106             | 3600107               | 3600104                       | 3600105           |
| <b>Source:</b> Lebanon Crushed Stone    | Lebanon Crushed Stone | Lafarge, Montreal, East Plant | Lafarge, Balt, MD |
| <b>Proportion:</b> 58.1%<br>(by weight) | 41.9%                 | 80.0%                         | 20.0%             |



| Date     | Age, days | Condition | Specimen Expansion, % |       |       | Average |
|----------|-----------|-----------|-----------------------|-------|-------|---------|
|          |           |           | A                     | B     | C     |         |
| 02/06/14 | 0         | 1N NaOH   | 0.000                 | 0.000 | 0.000 | 0.00    |
| 02/07/14 | 1         | 1N NaOH   | 0.006                 | 0.006 | 0.005 | 0.01    |
| 02/10/14 | 4         | 1N NaOH   | 0.010                 | 0.009 | 0.008 | 0.01    |
| 02/13/14 | 7         | 1N NaOH   | 0.012                 | 0.017 | 0.010 | 0.01    |
| 02/17/14 | 11        | 1N NaOH   | 0.020                 | 0.025 | 0.018 | 0.02    |
| 02/20/14 | 14        | 1N NaOH   | 0.023                 | 0.027 | 0.021 | 0.02    |

**Notes:**

- Test specimens are 1x1x11.25-in. mortar bars.
- A water-cement ratio of 0.50 by mass was used to fabricate test specimens.
- Submitted aggregates and cementitious materials were used to fabricate test specimens. The chemical compositions of the cementitious materials were not provided.
- Testing a combination of aggregates modifies the test method. The expansion criteria may not be applicable for modified test.
- Per AASHTO T303, Section 9.1, Note 5, "When the mean expansion of the test specimens exceeds 0.10 percent at 16 days from casting (14 days from zero reading), it is indicative of potentially deleterious expansion. When the mean expansion of the test specimens is less than 0.10 percent at 16 days after casting, it is indicative of innocuous behavior."
- This report may not be reproduced except in its entirety.

## Carroll Concrete Company

|                                   |                        |              |                   |                   |  |                    |
|-----------------------------------|------------------------|--------------|-------------------|-------------------|--|--------------------|
| Date cast                         | 12/5/2013              |              |                   |                   |  |                    |
| Specimen type                     | Concrete               |              |                   |                   |  |                    |
| Number of specimens               | 1                      |              |                   |                   |  |                    |
| Specimen ID                       | BAR2                   |              |                   |                   |  |                    |
| Size of specimens                 | 3x10"                  |              |                   |                   |  |                    |
| Specimen storage                  | In water at 70 degrees |              |                   |                   |  |                    |
| Mix design                        |                        |              |                   |                   |  |                    |
| Lafarge Tercem                    | 720                    |              |                   |                   |  |                    |
| Newcem                            | 180                    |              |                   |                   |  |                    |
| 3/4" (#67) Ledge, Lebanon Crushed | 1630                   |              |                   |                   |  |                    |
| Washed sand, Lebanon Crushed St   | 1175                   |              |                   |                   |  |                    |
| Water, lbs                        | 267                    |              |                   |                   |  |                    |
| Micro Air                         | 7.5                    |              |                   |                   |  |                    |
| Glenium 7500, 12/cwt              | 108                    |              |                   |                   |  |                    |
| Rheotec Z60, 3/cwt                | 27                     |              |                   |                   |  |                    |
| MasterLIFE SRA20, 1.25 gallons    | 160                    |              |                   |                   |  |                    |
|                                   |                        |              |                   |                   |  |                    |
| Slump                             | 9.5"                   |              |                   |                   |  |                    |
| Air content                       | 7.00%                  |              |                   |                   |  |                    |
| Concrete temperature              | 53 F                   |              |                   |                   |  |                    |
| Ambient temperature               | 37 F                   |              |                   |                   |  |                    |
|                                   |                        |              |                   |                   |  |                    |
|                                   |                        |              |                   |                   |  |                    |
|                                   |                        |              |                   |                   |  |                    |
| Age                               | Comparator reading     | beam reading | Lx                | Li                |  | Length change %    |
| 24 hours                          | 0.0295                 | 0.2322       | 0.2027            | 0.2027            |  | 0.0000             |
| 7 days                            | 0.0284                 | 0.2312       | 0.2028            | 0.2027            |  | 0.0010             |
| 14 days                           | 0.0303                 | 0.2308       | 0.2005            | 0.2027            |  | -0.0220            |
| 21 days                           | 0.0284                 | 0.2299       | 0.2015            | 0.2027            |  | -0.0120            |
| 28 days                           | 0.0291                 | 0.2323       | 0.2032            | 0.2027            |  | 0.0050             |
| <del>56 days</del>                |                        |              | <del>0.0000</del> | <del>0.2027</del> |  | <del>-2.0270</del> |

**STATE OF VERMONT  
AGENCY OF TRANSPORTATION  
MATERIAL AND RESEARCH SECTION - STRUCTURAL CONCRETE UNIT**

**STRUCTURAL CONCRETE MIX DESIGN SUBMISSION**

Concrete class: HPC A  
 Additional Description \_\_\_\_\_  
 Ready Mix Supplier: CARROLL CONCRETE - W LEBANON, NH - RT 12A  
 Designed By Scott Jordan  
 Design strength \_\_\_\_\_ 5000 \_\_\_\_\_ PSI  
 Mix Design Style: Conventional  
 Agg weight - SSD or Dry: SSD

| Agency Use Only |          |
|-----------------|----------|
| Mix ID          | HP00-A-0 |
| Mix Design #    | _____    |
| Approved by     | _____    |
| Approved Date   | _____    |
| Spec Book Year  | 2011     |

Mix designs are valid for a 12 month period from date of approval or unless there is a change in material, material property or design parameter.

|  |   |  |                     |                                |
|--|---|--|---------------------|--------------------------------|
| <b>Cement:</b>                             |   | Specific Gravity _____                       | _____ lb/cy         | _____ cf                       |
| 701.02                                     | Source: _____<br>Brand Name: _____  |  |                     |                                |
| <b>Cement Type III:</b>                    |   | Specific Gravity _____                       | _____ lb/cy         | _____ cf                       |
| 701.04                                     | Source: _____<br>Brand Name: _____  |  |                     |                                |
| <b>Blended Cement:</b>                     |   | Specific Gravity <u>2.980</u>                | <u>660</u> lb/cy    | <u>3.55</u> cf                 |
| 701.06                                     | Source: <u>LAFARGE - TERCEM - MONTREAL, EAST PLANT</u><br>Brand Name: _____                       |  |                     |                                |
| <b>Cement with Slag:</b>                   |   | Specific Gravity _____                       | _____ lb/cy         | _____ cf                       |
| 701.07                                     | Source: _____<br>Brand Name: _____  |  |                     |                                |
| <b>Pozzolan:</b>                           |   | Specific Gravity _____                       | _____ lb/cy         | _____ cf                       |
| 725.03(a)                                  | Source: _____<br>Brand Name: _____  |  |                     |                                |
| <b>Fly Ash:</b>                            |   | Specific Gravity _____                       | _____ lb/cy         | _____ cf                       |
| 725.03(a)                                  | Source: _____<br>Brand Name: _____  |  |                     |                                |
| <b>Silica Fume:</b>                        |   | Specific Gravity _____                       | _____ lb/cy         | _____ cf                       |
| 725.03(b)                                  | Source: _____<br>Brand Name: _____  |  |                     |                                |
| <b>Slag:</b>                               |   | Specific Gravity _____                       | _____ lb/cy         | _____ cf                       |
| 725.03(c)                                  | Source: _____<br>Brand Name: _____  |  |                     |                                |
| <b>Water</b>                               |   |  |                     |                                |
| <b>Air Content Target</b>                  |   | 32 gals                                      | <u>267.04</u> lb/cy | <u>4.28</u> cf                 |
| <b>Coarse Aggregate 3/8"</b>               | Absorption _____  | 7.0 %  | _____ lb/cy         | <u>0.00</u> cf                 |
| 704.02A                                    | Source: _____   |  |                     |                                |
| <b>Coarse Aggregate 3/4"</b>               | Absorption <u>0.70</u>  | Specific Gravity <u>2.930</u>                | <u>1769</u> lb/cy   | <u>9.68</u> cf                 |
| 704.02B                                    | Source: <u>LEBANON CRUSHED STONE - W LEBANON, NH</u>  |  |                     |                                |
| <b>Coarse Aggregate 1 1/2"</b>             | Absorption _____  | Specific Gravity _____                       | _____ lb/cy         | <u>0.00</u> cf                 |
| 704.02C                                    | Source: _____   |  |                     |                                |
| <b>Fine Aggregate:</b>                     | Absorption <u>1.40</u>  | Specific Gravity <u>2.700</u>                | <u>1280</u> lb/cy   | <u>7.60</u> cf                 |
| 704.01                                     | Source: <u>LEBANON CRUSHED STONE - W LEBANON, N</u>   | Fineness Modulus <u>2.78</u>                 |                     |                                |
| <b>Air Entrainment Admixture</b>           |   | Specific Gravity _____                       | <u>1</u> oz/cy      |                                |
| 725.02(b)                                  | Source: <u>MASTER BUILDERS INC - MESQUITE, TX</u><br>Brand Name: <u>MasterAir AE 200/MicroAir</u> |  |                     |                                |
| <b>Retarder Admixture:</b>                 |   | Specific Gravity _____                       | <u>0.5</u> oz/cwt   |                                |
| 725.02(c)                                  | Source: <u>MASTER BUILDERS INC - MESQUITE, TX</u><br>Brand Name: <u>MasterSet R100</u>            |  |                     |                                |
| <b>High Range Water Reducer Admixture:</b> |   | Specific Gravity _____                       | <u>4</u> oz/cwt     |                                |
| 725.02(h)                                  | Source: <u>MASTER BUILDERS INC - MESQUITE, TX</u><br>Brand Name: <u>MasterGlenium 7500</u>        |  |                     |                                |
| <b>Other Admixtures:</b>                   |   | Specific Gravity _____                       | _____ gal/cy        | <u>0.00</u> cf                 |
|  | Source: _____<br>Brand Name: _____  |  |                     |                                |
|  |   | Specific Gravity _____                       | _____ oz/cwt        | <u>0.00</u> cf                 |
|  | Source: _____<br>Brand Name: _____  |  |                     |                                |
|  |   | Specific Gravity _____                       | _____               | <u>0.00</u> cf                 |
|  | Source: _____<br>Brand Name: _____  |  |                     |                                |
|  |   | <b>TOTAL</b>                                 | <u>47.610</u>       | <u>3976</u> lb <u>27.00</u> cf |
|  |   | Maximum Water/Cementitious Ratio <u>0.42</u> |                     |                                |
|  |   | Maximum Water (gal/cy) <u>33.5</u>           |                     |                                |
|  |   | Slump Min/Max (inch) <u>4.0</u> min          | <u>8.0</u> max      |                                |
|  |   | Air Content Min/Max (%) <u>5.0</u> min       | <u>9.0</u> max      |                                |
|  |   | Design Unit Wt. (lb/cf) <u>147.26</u>        |                     |                                |

Notes: